A. Compilation of INRECA Methodology Applications

A.1 ANALOG DEVICES – Sales Support for Integrated Circuits

For the past 10 years we have tried, like our competitors, to develop a satisfactory parametric search engine that would help our pre-sales people. With two-foot-thick catalogs describing thousands of ICs, finding the right product or the closest to the customer’s needs is not an easy job, even for a well-trained engineer. We tried CBR and in less than a year we had a unique and successful presales tool.

David Kress, Director of Applications Engineering, Analog Devices

With sales of $2.3 billion for fiscal year 2001, Analog Devices is a leading provider of precision, high-performance integrated circuits used in analog and digital signal processing applications. Analog Devices designs, manufactures, and markets a broad range of high-performance linear, mixed-signal, and digital integrated circuits. Headquartered in Norwood, Massachusetts, the company employs more than 8,500 people worldwide and has manufacturing facilities in the United States, Europe, and Asia.

With thousands of products, Analog Devices was, until now, printing catalogues and data sheets up to two feet thick each year. The cost of printing and shipping catalogs to its 60,000 customers worldwide approached $4 million per year.

Most of Analog Devices’s products within a product line differ from each other by only one element and can be described by as many as 50 parameters. Technical support presales engineers take the customer’s requirements over the phone and try to find a match in the Analog Devices product range, a complex process that involves weighting dozens of constraints while at the same time interacting with the customer, usually a design engineer, to try to understand his, or her, real priorities. This lengthy process can be successfully accomplished only by well-trained engineers.

For the past ten years, Analog Devices, like its competitors, tried to solve this problem with half a dozen software projects using a standard database management system. But this approach was not very helpful, since SQL-style searches only return a value when all conditions are met exactly. When a customer provides a
complete set of specifications, the most likely answer is “no match,” but when he
or she relaxes some of the specifications, hundreds of matches are found.

The solution was developed by Interactive Multimedia Systems (IMS) around
“orange – empolis knowledge manager.” Using “nearest neighbor matching,” IMS
produced a working prototype in fewer than six months.

Called parametric search, the system allows customers to specify interactively
their product requirements, then finds either the right product or the product as
close as possible to their needs. With this system, the customer enters the
specifications directly onto the screen. Values can be numbers or information, such
as “the best,” “sort of,” or “less than.”

The parametric search system always provides an answer: a list of the top ten
Analog Devices’ products that are closest to the specified requirements. If the user
is not satisfied, another search can be started with new priorities until the right
product is found.

The parametric search is now available on Analog Devices’ operational
amplifiers and data converters and will soon be available for a further six product
lines. The system is available to customers on a CD-ROM catalog and on the
company website. Analog Devices is expecting a savings of $2 million per year,
since the cost of producing and shipping 120,000 CD-ROMs is far less expensive
than producing the paper catalogs.

But it is the quality of the service the parametric search system provides that
makes the difference in this very competitive market. Now, when customers call
sales support, they usually know exactly what they want and order exactly what
they need. For the support engineer, this means having more time to concentrate on
truly complex customer requirements. Because the system keeps track of the
customers’ requests, Analog Devices can analyze this valuable marketing
information and use it to design new products.

A.2 ANSALDO – Maintaining the Metro in Naples

An advantage of CBR, particularly compared to rules, is that the knowledge base
can be very easily updated. Thanks to CBR, we produced a tool that allows
maintenance staff who do not have specialized skills in computer science to update
almost the entire knowledge base.

Antonio Ruggieri, Ansaldo Trasporti

In Southern Italy, the Circumvesuviana Railways have operated the busy
railway lines of Naples’ suburbs for over 100 years. With a usual life span of 40
years for a train, the cost of maintaining the 200 vehicles is critical. According to
the Italian Railway Company, the maintenance costs for electric traction vehicles
represents 60% of the life cycle cost of a locomotive, which is much more than the
acquisition cost, even at $3 million a piece. Increasing the availability of railway